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EXAMINER

DINH, TUAN T

ART UNIT PAPER NUMBER

2841

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 03/19/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

09/848,140

Applicant(s)

OSANAI ET AL.

Examiner

Tuan T. Dinh

Art Unit

2841

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 23-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 23-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 12/06.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Noted of the claimed language:

Examiner is considered the term "adapted to" as well defined as an intended use limitation. The claim limitation that employ phrases of the type "adapted to" is typical of claim limitation which may not distinguish over prior art according to the principle. It has been held that the recitation that an element is "adapted to" perform or is "capable of being" performing a function is not a positive limitation but only requires the ability to so perform, see *In re Venezia*, 189 USPQ (CCPA 1976).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-2, 4-7, 23-24, 26-27, and 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang (U. S. Patent 4,531,044) in view of Tsujimura et al. (U. S. Patent 6,197,435), and further in view of Edwards et al. (U.S. Patent 5,650,662).

As to claims 1, 4-6, 35, Chang disclose a metal-ceramic circuit board as shown in figures 3 and 8 comprising

a aluminum alloy base plate (16, column 4, line 9) and a ceramic substrate board (15, column 4, line 5) made of alumina (column 4, lines 23-29), wherein one surface (a

bottom surface) of the ceramic substrate board (15) is bonded directly to the aluminum base plate (16), see figure 3, the aluminum base plate (16) having a thickness not smaller than 1mm, see column 4, lines 32-34, the base plate (16) is larger than the ceramic substrate (15).

Chang does not disclose the aluminum alloy base plate having a proof stress not higher than 95MPa.

Tsujimura et al. show a substrate for used in a power module (column 6, lines 11-12) comprising a first metal, which is an aluminum alloy base plate having a proof stress not higher than 95Mpa, see column 9, lines 58-60.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a proof stress (yielding strength) not higher than 95Mpa of a aluminum/aluminum alloy base plate in the metal-ceramic circuit board of Chang, as taught by Tsujinura et al., in order to provide a maximum deflection and anti breaking strengths of the metal base of the circuit board.

Chang and Tsujimura do not show the ceramic substrate bonded directly to the base plate without any intervening material, and the AL or AL alloy base plate being molten, contacted with the ceramic substrate, and cooled.

Edward et al. teach a technique of direct bonding between a heat spreader (16) and a ceramic layer (20) of a substrate (14) as shown in figures 1-4 without any intervening material therebetween, column 4, lines 48-65, the technique of the direct bonding between the heat spreader (16) to the ceramic substrate of cause, the heat spreader inherently being melted and contact with the ceramic substrate.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a teaching of Edwards employ the circuit board of Chang and Tsujimura in order to direct transfer heat.

As to claim 2, Chang disclose the board as shown in figures 3 and 8 wherein the other surface (a top surface) of the ceramic substrate board (15) has a metal conductive member (14, column 4, lines 4-5).

As to claims 7 23-24, 26, 36-37, Chang disclose a module (column 1, line 57) as shown in figures 3 and 8 comprising

a aluminum alloy base plate (16),

a ceramic substrate board (15), and the base plate (16) having an area larger than the substrate board (15)

a semiconductor tip (14), wherein one surface of the ceramic substrate (15) board is bonded directly to the base plate (16), said semiconductor tip (14) is provided on the other surface of said ceramic substrate board (15), the aluminum base plate (16) having a thickness not smaller than 1mm, see column 4, lines 32-34.

Chang does not disclose the aluminum alloy base plate having a proof stress not higher than 95MPa.

Tsujimura et al. show a substrate for used in a power module (column 6, lines 11-12) comprising a first metal, which is an aluminum alloy base plate having a proof stress not higher than 95Mpa, see column 9, lines 58-60.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a proof stress (yielding strength) not higher than 95Mpa

of a aluminum/aluminum alloy base plate in the metal-ceramic circuit board of Chang, as taught by Tsujinura et al., in order to provide a maximum deflection and anti breaking strengths of the metal base of the circuit board.

Chang and Tsujimura do not show the ceramic substrate bonded directly to the base plate without any intervening material, and the AL or AL alloy base plate being molten, contacted with the ceramic substrate, and cooled.

Edward et al. teach a technique of direct bonding between a heat spreader (16) and a ceramic layer (20) of a substrate (14) as shown in figures 1-4 without any intervening material therebetween, column 4, lines 48-65, the technique of the direct bonding between the heat spreader (16) to the ceramic substrate of cause, the heat spreader inherently being melted and contact with the ceramic substrate.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a teaching of Edwards employ the circuit board of Chang and Tsujimura in order to direct transfer heat.

As to claim 27, Chang discloses the base plate made of aluminum alloy acts as a heat sink.

4. Claims 3, 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang, Tsujimura et al. and Edwards, and further in view of Nagase et al. (U. S. Patent 6,033,787).

Chang, Tsujimura, and Edwards disclose all of the limitations of the claimed invention, except for the conductive member made by a material selected from copper/copper alloy, and aluminum/aluminum alloy.

Nagase et al. shows a metal conductive member (11) made of aluminum material bonded on a ceramic substrate (13), see figure 1.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a metal conductive member made of aluminum on the substrate of Chang, Tsujimura, and Edwards, as taught by Nagase et al. for the purpose of improving a thermal conductivity and heat resistance.

5. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang in view of Tsujimura and Edwards, and further in view of Prior Art (submitted by applicant, figure 5).

Regarding claim 28, Chang, Tsujimura, and Edwards do not specific disclose the conductive member bonded on the surface of the substrate board by using a brazing material.

APA-figure 5 shows a conductive member (8) bonded on a substrate board (2) by using a brazing material.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a teaching of APA employed in the circuit board of Chang, Tsujimura, and Edwards in order to provide a flexure for the circuit board without damaging components mounted on the board.

6. Claims 29-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang, Tsujimura, Edwards, and further in view of Downes, Jr. et al. (U.S. Patent 6,373,717).

Regarding claims 29-34, As to claims 29-34, Chang, Tsujimura, and Edwards disclose the circuit or the power module, except for a withstand a thermal cycle test of at least 1000 or 3000 times.

Downes shows an electronic package comprising a multilayer board having a thermal cycle test at least 100-300 times.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a teaching of Downes employed in the circuit board of Chang, Tsujimura, and Edwards in order to maintain a steady state temperature.

Response to Arguments

7. Applicant's arguments with respect to claims 1-7, and 23-34 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan T. Dinh whose telephone number is 571-272-1929. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Reichard Dean can be reached on 571-272-1984. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Tuan Dinh
March 12, 2007.